C.F.I. Bulletin

INSTITUT CANADIEN DU FILM
Collège Jean-de-Brébeuf,
3200 Chemin Ste-Catherine, Montréal 26

CANADIAN FILM INSTITUTE
Head Office,
1762 Carling Avenue, Ottawa 3

Sir George Williams University
PER STACKS
PN 1993 C37

SCIENCE ON FILM

The National Science Film Library was established by the Canadian Film Institute in June with the support of the National Research Council. The Director of the Library, Mr. Peter Morris, discusses below a few aspects of science films and comments on the work of the National Science Film Library in relation to them:

It is absolutely essential that there be a much wider spread and clearer understanding of science and what science is all about."—Dr. H.S. Armstrong addressing the Royal Society of Canada in 1962.

"Scientific cinematography serves the noble aim of popularising the achievments of science and engineering, dissemination of knowledge; it facilitates correct understanding of nature and the laws of the universe."—Academician Blagonravov.

"It is, I would submit to you, of urgent importance... that the effort should be made to understand what science is about and what it can achieve... Communication and understanding can be greatly helped by combining visual pictures with the spoken word—the method of the documentary film." —Sir John Cockcroft.

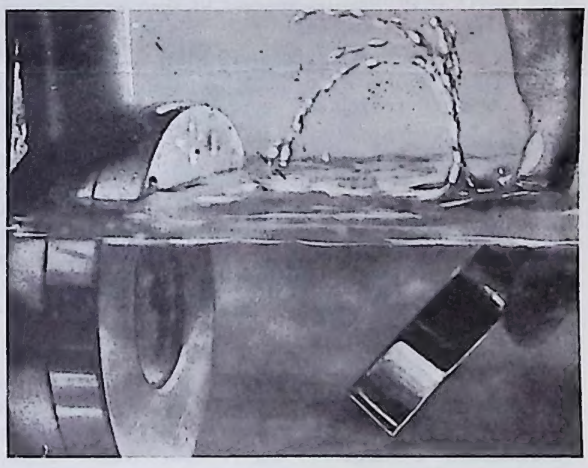
"We are still at an early stage of the film's application as a research tool... During the next hundred years the time modifying techniques of the film—high speed photography and time lapse photography—may well come to rival the microscope and the telescope as aids towards the understanding of nature."—Dr. D.A. Spencer.

It is rather a surprising fact that, although the cine camera was originally constructed by the physiologist E.J. Marey as an instrument for scientific investigation, it is only lately that the affinity between science and film has been properly recognised. The film camera is, in essence, a recording instrument. It can record whatever the eye can see and a great deal that it cannot. It can both analyse and re-construct movement, and, with refined camera mechanisms and lenses, offers complete mastery over time scales and dimensions. The camera can be adapted for use with almost any other scientific instrument, and in recent years ultra-violet and infra-red rays, ordinary and ultramicroscopes, phase contrast and luminescent methods, X-rays and electron microscopes have all be used in constructing films for scientific investigation and interpretation. In the hands of investigators like Percy Smith, Jean Painlevé, Jean Comandon and J.V. Durden scientific cinematography has not only added some notable extensions to our knowledge and understanding of the physical world but has often revealed the beauty and harmony of the Universe.

In biology, for example, film has been of value in apparently speeding-up processes which naturally go on for days or weeks and in the combination of the camera with the microscope. The remarkable pioneer work of the late Dr. Canti in showing the growth of cancer cells may be instanced in this connection. Perhaps the best known examples of biology films are the popular classics—THE SECRETS OF LIFE and THE SECRETS OF NATURE by Percy Smith, Mary Field and J.V. Durden.

In mathematics, film has been used to visualise both simple and higher mathematics. The pioneers in this field were Robert Fairthorne and Brian Salt who, in films like X PLUS X EQUALS A SIN Nt, expressed complex mathematics in simple visual terms. Their films were praised by both teachers and expert mathematicians and it is regrettable that they never continued their pre-war experiments. Recently, the National Film Board demonstrated how a film can be exciting both mathematically and visually with FOUR LINE CONICS.

In industry some firms have used film for recording factory processes. Faulty performances of a component may only occur when the machine is running at high speed. Slow motion film studies can then provide valuable records, and many improve-



The science film in education — THE PRINCIPLES OF ULTRASONICS, jointly sponsored by Mullard Electronics and the Educational Foundation for Visual Aids.

vements in machinery design have stemmed from a use of such records.

Because the list of subjects that can be investigated or interpreted by the use of film is practically endless it is more convenient, when discussing science films, to consider them according to their *purpose* rather than their subject matter. The three main types of science films considered in this way are: *the research film; the educational or instructional film and the popular science or interpretive film.*

The Research Film

Since the early experiments of the French phsysiologist, E.J. Marey, who first used film in 1888 to assist him in his studies of animal and human locomotion, the use of film as a tool for recording scientific research has been fruitful and increasingly widespread. The advantage of a film record over any other is that it is a dynamic record, the time factor or the dimensions may be varied at will and the camera can record experiments even when the investigator is not present. When the camera is combined with other instruments the potentialities of film research records are manifold.

Russian and German scientists have made the most extensive use of film as a research tool. In the USSR many Research Institutes and Universities have their own film studios, whilst the others draw extensively on the equipment and services of the various national film studios. Unfortunately, we have seen very few of these productions in Canada—though such films as EXPERIMENTS IN THE REVIVAL OF ORGANISMS and the early MECHANICS OF THE BRAIN by Pudovkin have left us eager and expectant for more.

Recent examples of the use of film in research have included N. Bombrowksi's study of THE ATOMISATION OF LIQUIDS, photographed at 3,000 frames a second and J.V. Durden's study of insect pests on behalf of Shell Oil. There are ten films in this series, each devoted to the life cycle of an insect that attacks fruit trees, and, utilising a wide range of film techniques, they provide a unique record for entomologists. The use of film for studying fluid mechanics has been receiving attention recently, and a special committee of the American Society of Mechanical Engineers has been devoting considerable effort to promoting the use of film as a research tool in this area.

The Educational Film

In the educational science film—perhaps the most widely recognised type of science film in Canada today—knowledge is treated in a way which is suitable for a spectator with a certain level of training who is studying the subject. This type of film may be directed to any level: elementary and secondary schools, universities, technical training schools and workers courses—and the potential use of the film is usually specified by the producer.

There have been some excellent examples of the educational science film, notable among which is the series of films produced by Gaumont-British Instructional with the co-operation of such scientists as Professor Julian Huxley. More recently there has been the Advanced Science Series prepared by the Educational Foundation for Visual Aids (among which are. THE LINEAR ACCELERATOR; PRINCIPLES OF ULTRASONICS; FRICTION and THE SPECTROGRAPH) and the Series on TECHNIQUES OF ORGANIC CHEMISTRY with script and demonstrations by Professor Louis F. Fieser.

The Popular Science Film

The popular science, or interpretive science, film is designed to present factual scientific knowledge in a way that is meaningful to the general public. Their purpose is to interpret scientific achievments and they may be considered one of the scientists' means of communication with society. Sir John Cockcroft commented recently: "When I travel about the world I usually take one or two films with me... I think we could with profit produce many more such films, and in this way help to break down the serious barriers between the scientists and the rest of the world."

The titles of brilliant interpretive science films are almost too numerous to mention, but the continuing work of the Shell Oil Film Unit over many years is particularly significant. Its production of such films as THE RIVAL WORLD, POWERED FLIGHT and UNSEEN ENEMIES has done much to interpret the complex world of science to the layman. Elton's and Bell's THE TRANSFER OF POWER is a classic of its kind in the way it not only describes the evolution of a technical tevice with lucidity and coherence but interprets this evolution in the wider context of the social pattern. More recently, the films of the United Kingdom Atomic Energy Authority have been generally praised for their ability to explain the complexities of the atomic age to the general public. Many of the National Film Board productions have also been widely admired in this connection; among these productions might be mentioned: THE WORLD AT YOUR FEET, EMBRYONIC DEVELOPMENT: THE CHICK, RADIATION, and MICROSCOPIC FUNGI.

The science film in research—A German high-speed micro-photographie study of a metal-spraying nozzle. This still shows dispersed metal particles in an oxy-acetylene flame photomicrographed at less than one millionth of a second exposure time.

The National Science Film Library, in attempting to serve the audiences interested in each of these types of science films, has three basic aims: to maintain a national repository of science films and to distribute these films to interested organisations and individuals; to collect and disseminate information about scientific, technical and industrial films; and to provide a variety of specialised services designed to encourage the use of science films as factors in developing a wider understanding of science and the scientific method.

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—"SCIENCE ON FILM" continued

A National Repository of Science Films

The Library hopes that the collection of science films in its national repository will fully reflect the diversity of interest and purpose shown in the three types of film: research, educational and popular science. At the moment the collection of some 700 titles is restricted almost entirely to the educational and interpretive types of film although practically all subjects in the pure and applied sciences are covered. Negotiations are continuing with producers and owners of significant and important science films to enable them to deposit copies of their films with the National Library, and announcements of outstanding additions to the Library's collection will be made as they occur. A catalogue of films in the Library is presently in preparation, and it is hoped that this catalogue will be published later this year.

There is a very significant lack of research films in the Library at the present time—a lack which may be due to disinterest on the part of Canadian scientists in using film as a research tool, or to the previous dearth of information of the potentialities and applications of the research film or to the absence of documentation on the existence and source of research films in Canada. The Library will attempt to fill this latter need, at least, by compiling records of the existence of research films and eventually hopes to maintain a comprehensive collection of record material on film. The Library will be most happy to hear from scientists who have produced research films and who would be interested either in depositing their films, or the information concerning them, with the National Library.

In the area of the educational science film the Library will endeavour to determine the needs of Canadian educators for science films, and will attempt to further the distribution of films required to fill these needs. The Library will also encourage the use of science films in industry both as an educational and instructional tool and as a means for furthering the exchange of formation between research scientists and industry.

In the popular science film field the Library will attempt to encourage a wider public appreciation of science and its role in society by distributing science films of general interest, by promoting special showings of science films and by encouraging the formation of scientific film societies, such as those which existed some years ago in Montreal, Toronto and Ottawa.

The vast majority of the Library's films will be available on a service charge basis. This service charge is NOT a rental and is made only to cover the costs involved in the handling of the films by CFI.

Information Service

The Information Service of the Library will be as extensive as possible and will attempt to serve all potential users of the Library. Information in a general way will be distribute by such means as information sheets, listings in scientific journals and the CFI Bulletin and by special subject catalogues. The Library also offers a more specialised service through which advice may may be obtained as to the availability and suitability of films for particular purposes.

Advice and assistance from the Information Service of N.S.F.L. ranges from the titles of latest releases, to suggestions for programming, guidance on available films on specific subjects and special investigation projects undertaken on behalf of organisations. A recent example of this latter service is a nine-program Series of science films prepared for the University of Toronto Library and titled: "The Scientific Progress of Mankind".

The Library is in contact with all the main sources of production and distribution of science films, and eventually hopes to maintain a central index of all such films available in Canada.

The Library will always be grateful for information about films on science and technology; copies of such information should be sent to the National Science Film Library at CFI.

Evaluations

The Library organises panels, composed of subject specialists educators and film experts, to review and evaluate scientific, industrial and technical films. These Evaluations, which are made available to all users of the Library, give technical data, details of distribution, an objective synopsis of subject content, an evaluation based on the collective views of the panel and recommendations of audience suitability.

Under special circumstances and where no evaluation exists for a film, the Library will arrange for one to be prepared and forwarded to the organisation requesting the review.

Film Purchases

The National Science Film Library, unfortunately, has no funds available for the purchase of films, and must depend very heavily on deposits to augment its collection. However, the Library will offer advice to organisations and individuals interested in purchasing science films, and it will assist in the importation of films from other countries if required.

Organisations who purchase worthwhile science films through the Library will always be encouraged to deposit these films with the National Library. Films deposited in this way remain the property of the depositor, may be used by the depositor without charge and may be withdrawn at any time, whilst the Library becomes responsible for promoting and circulating these films on a national scale.

In cases where two or three organisations are interested in the same film and where the funds available from any one organisation are insufficient to meet the costs of purchase, the Library will also assist these organisations in the joint acquisition of the particular film if such an approach seems feasible and desirable at the time.

Because the Library intends to be involved with films and information on research, educational and interpretive science films, the services of the Library will be generally available to scientists in research organisations, industry and universities and colleges; to educators in universities, colleges and schools; and to interested members of the general public.

"The one force of cohesion which is truly supranational", said Sir Eric Ashby, "is our common faith in science. We may differ from Kruschev over politics, from Nasser over the aspirations of the Arab world, from the Irish over religion; but we are unanimous with all these people over the laws of gravitation and the properties of the oxides of nitrogen." We are hopeful that the National Science Film Library through its services will be able to offer something to this common bond and to increase the depth of understanding amongst scientists and between scientists and the rest of society.

CINÉMATHÈQUE NATIONALE SCIENTIFIQUE

LA CINÉMATHÈQUE NATIONALE SCIENTIFIQUE fut établie en juin 1962 à l'Institut Canadien du Film avec l'appui du Conseil National des Recherches. Les trois principaux buts de la Cinémathèques sont: de maintenir un dépôt national de films scientifiques en anglais et français, et de distribuer ces films aux individus et aux groupes intéressés; de recueillir et de répandre des renseignements au sujet de films scientifiques, techniques et industriels en français et anglais; de pouvoir divers services spécialisés dans le but d'encourager l'appréciation et l'usage de films techniques et scientifiques afin de mieux faire comprendre les sciences et la méthode scientifique.

La Cinémathèque comprend présentement quelques 700 films anglais et français qui y ont été placés par un grand nombre d'organismes. Ces films traitent de sujets tels que la chimie, la physique, la biologie, le génie électrique, la technologie nucléaire, la technique d'atelier et la technologie industrielle. Le catalogue des films qui se trouvent dans la cinémathèque est en voie de préparation. On peut commander des copies de ce catalogue en écrivant à LA CINEMATHÈQUE NATIONALE SCIENTIFIQUE à l'adresse donnée ci-dessous. Les démarches se continuent auprès des producteurs de films scientifiques afin qu'ils puissent mettre leurs films en dépôt à LA CINÉMATHÈQUE NATIONALE SCIENTIFIQUE où on verra à en faire la promotion et la distribution par tout le Canada. Les usagers des services de la Cinémathèque seront avisés des acquisitions de nouveaux films dès qu'ils seront reçus.

Toutefois, le maintien et la distribution des films n'est qu'un des services offerts par LA CINÉMATHÈQUE NATIONALE SCIENTIFIQUE. Trois autres des services les plus importants sont:

RENSEIGNEMENTS

A LA CINÉMATHÈQUE NATIONALE SCIENTIFIQUE on amasse et on distribue des renseignements sur les films scientifiques anglais et français. Des conseils sont offerts sur la disponibilité et la convenance de films scientifiques pour certain projets.

Ces conseils et l'aide offerts par les services de renseignements de la Cinémathèque peuvent avoir trait aux réalisations les plus récentes; on peut offrir des suggestions de programmation, indiquer quelle est la disponibilité de films sur certains sujets, et entreprendre des projets d'enquête pour certaines organisations. Récemment, on a monté une série de neuf programmes de films scientifiques "Le Progrès Scientifique de l'Humanité" pour le compte de la Bibliothèque de l'Université de Toronto.

Les préposés à la Cinémathèque se tiennent en contact avec les principales sources de production et de distribution de films scientifiques, et en fin de compte maintiendront un répertoire de tous les films scientifiques anglais et français disponibles au Canada.

A LA CINÉMATHÈQUE NATIONALE SCIENTIFIQUE on recevra toujours avec plaisir les renseignements au sujet de films scientifiques et technologiques. Ces renseignements devraient être envoyés à l'adresse donnée ci-dessous.

EVALUATIONS:

Un autre service offert par LA CINÉMATHÈQUE NATIONALE SCIENTIFIQUE est de choisir des juries composés de spécialites et d'experts qui visionneront et donneront une évaluation des films scientifiques, industriels et techniques, et anglais et français. Ces évaluations, qui seront mises à la disposition de tous les usagers de la Cinémathèque, comprendront les renseignements techniques, les détails de la distribution, un résumé du contenu du film, une évaluation basée sur les opinions du jury, et des recommandations sur la convenance pour certains auditoires.

Sur demande spéciale, quand aucune évaluation n'a été faite d'un film, on verra à en faire préparer une et à la faire parvenir au demandeur.

Les producteurs et les distributeurs qui veulent faire évaluer et promouvoir leurs films peuvent écrire à LA CINÉMATHÈQUE NATIONALE SCIENTIFIQUE.

ACHATS

Sur demande, LA CINÉMATHÈQUE NATIONALE SCIENTIFIQUE renseignera les organisations et les individus sur l'achat de films scientifiques anglais et français, et aidera à importer des films d'autres pays si c'est nécessaire.

La Cinémathèque aidera aussi aux organisations qui voudront faire conjointement l'achat de films scientifiques.

Tous ces services sont à la disposition des hommes de science préposés aux recherches, à l'industrie, au commerce, aux collèges et aux universités, aux éducateurs dans les universités et les collèges, et au public en général.

Les organisations et les individus qui désirent recevoir les communiqués, les évaluations ou le catalogue, ou qui ont des demandes particulières à faire devraient s'adresser à:

M. Peter Morris, Directeur,
Cinémathèque Nationale Scientifique,
Institut Canadien du Film,
1762 Carling,
Ottawa 3, Ontario.